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ABSTRACT

This study investigated cross-nationally preservice teachers' perceptions of the effectiveness of computers and technology in improving education. Participants were undergraduate education students from the United States and Taiwan; 180 students from each country were randomly selected. A survey instrument that identified types and amounts of technology resources generally found in elementary, middle, and high schools was used. The results indicate that preservice teachers in both countries valued a computer lab in each school and computers in each classroom higher than interactive video equipment or calculators. They also thought that these technology resources were more important and useful for students in high schools than in elementary or middle schools. Preservice teachers in the United States had more positive perceptions of the effectiveness of technology resources in improving education than their counterparts from Taiwan. Findings of this study and their educational implications are discussed. (Contains 1 table and 22 references.) (Author/AEF)

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Preservice Teachers' Perceived Effectiveness of Technology Resources: A Cross-National Study

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Abstract: This study investigated cross-nationally preservice teachers' perceptions of the effectiveness of computers and technology in improving education. Among all participants, 180 students each from the United States and Taiwan were randomly selected. A survey instrument that identifies types and amounts of technology resources generally found in elementary, middle, and high schools was used. The results indicate that preserve teachers in both places valued a computer lab in each school and computers in each classroom higher than interactive video equipment or calculators. They also thought that these technology resources were more important and useful for students in high schools than in elementary or middle schools. Preserve teachers in the United States, however, had more positive perceptions of the effectiveness of technology resources in improving education than their counterparts from Taiwan. Findings of this study and their educational implications are discussed in the paper.

Cross-national or cross-cultural studies of computers in education have gained considerable attention during the past decade. This may attribute to the feasibility of this type of approach in (a) testing the generalizability of attitudes toward computers originated in one country to others, (b) broadening the perspective of researchers and thus helping to strengthen our sensibility for idiosyncratic features of our own educational system, (c) contributing to a better understanding of the relative influence of some significant variables on educational computing, and (d) looking for universal variables and relationship between variables that are cross-culturally valid (Wubbels, 1993).

There have been a number of research paradigms in cross-national inquiries of educational computing and technology. The questions pursued, however, tend to center on (a) assessing computer use in education at elementary and secondary schools (Pelgrum & Plomp, 1993), (b) comparing college students' computer attitudes with respect to gender difference, confidence, and anxiety (Leutner & Weinsier, 1994; Marakis, 1992; Marcoulides & Wang, 1990; Sensales & Greenfield, 1995), and (c) examining preservice teachers' attitudes toward computers (Liao, 1995; Paprzycki, Vidakovic, & Ubermanowicz, 1995). Very little research, however, has specifically investigated and compared cross-nationally preservice teachers' perceptions of the effectiveness of computers and technology in improving education.

It is very important to examine preservice teachers' perceptions since research studies have found that teacher perceptions of computer and technology are closely related to their computer use (Brownell, Brownell, & Zirkler, 1993; Huang, 1994; Huang, Waxman, & Padron, 1995; Huang & Padron, 1997; Liao, 1993) and that teachers who were aware of ways computer could help do their job better (Sheingold & Hadley, 1990). Investigation of prospective teachers' perceptions of computers in education in the United States and in Taiwan may help to reveal how much these teachers knew about computer and technology resources as well as to accomplish some of the objectives Wubbels (1993) stated. Therefore, the purpose of this study is to compare perceptions of the effectiveness of computer and technology resources in improving education between preservice teachers in the United States and Taiwan.

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Methods

Subjects

The participants in the study were undergraduate education students from a southern state of the United States and northern Taiwan. Among all participants, 180 students from each place were randomly selected for study. Among the 360 sample subjects, 21% were male and 79% were female. Over 72% of them were between the ages of 18 and 25, 21% were between 26 and 35, and 7% were older than 35. Nearly 6% of them had never used a computer, and over 41% had used computer(s) for more than two years. However, the two groups of prospective teachers varied greatly in the compositions of their demographic variables. There were more males than females among preservice teachers from Taiwan than from the United States, whereas preservice teachers from the United States were older in age and had longer experience working with computers than their counterparts from Taiwan.

A computer course has been mandated as a teaching certification requirement in the southern state of the United States, and a "computer literacy" course was offered at the undergraduate level. In Taiwan, most colleges have offered introductory computer courses as prerequisites. The content of these courses contains the basic concept, operation of computers as well as software.

Instrument

The instrument used in this study is the Educational Technology Survey (Waxman, Huang, & Padron, 1992). This survey identifies types and amounts of technology resources that were generally found in elementary, middle, and high schools. It measures the extent to which the subject thinks that computer and technology resources will change schools and improve education of all students. All the 15 items are on a 5-point Likert-type rating, including "Very Effective," "Effective," "No Effect," "Ineffective," and "Very Ineffective" for improving students' education. In addition, there is a category for subjects to indicate that they are "Not Familiar" with the technology. A brief section on these prospective teachers' background was also included in the instrument.

The survey instrument was translated into Chinese for the use of sample subjects in Taiwan. Verification of the content validity of the Chinese version was done by reversing translation of it into English by English teachers who had not seen the English version. The result shows that there is no need for revision. The survey instrument has been found to be reliable and valid in prior studies (Padron, 1993). For the present study, the alpha reliability coefficient is .81 for the subjects in the U. S., and .90 for the subjects in Taiwan. This suggests that the instrument is reliable in measuring perceptions of these prospective teachers from both places.

Procedures and Analysis

The survey instrument was administered at the beginning of the academic year to the preservice teachers by experienced researchers in both nations. Preservice teachers responded anonymously. Frequency distributions displayed the percentage of preservice teachers' ratings on each resource item. A series of chi-square test was conducted to determine whether there were significant differences between preservice teachers from the United States and Taiwan in their perceived effectiveness of technology resources in improving education.

Results

The frequency distributions show that, in general, preservice teachers from both places thought that technology resources were effective rather than ineffective in improving education for all students. Over 60% of preservice teachers in the United States perceived that (a) a computer lab in each elementary, middle and high school, and (b) several computers for each elementary, middle and high school classroom would be "Very Effective" in enhancing education. Over 60% of preservice teachers in Taiwan thought that these two types of

computer resources were either "Effective" or "Very Effective." Less than 10% of preservice teachers from both places responded "Ineffective" or "Very Ineffective" for any type of technology resources, except the responses from preservice teachers in the U. S. on the *Calculators in elementary or middle schools* item.

Table 1 reports the chi-square results. The results from chi-square analyses reveal that there were significant differences between the two groups of preservice teachers in their perceived effectiveness of all types of technology resources in improving education. More preservice teachers in the United States than in Taiwan viewed that (a) a computer lab in each elementary, middle, and high school ($p < .001$), (b) several computers (4 to 5) for each elementary, middle, and high school classroom ($p < .001$), and (c) one computer for each elementary, middle, and high school classroom ($p < .01$) were "Very Effective," whereas more preservice teachers from Taiwan viewed these computer resources at all schools "Effective" rather than "Very Effective."

The Chi-square results also reveal that the two groups differed significantly in their perceived effectiveness of other technology resources. Again, more preservice teachers in the United States than in Taiwan indicated that calculators in elementary, middle, and high schools were "Very Effective" in bringing change and improving education, whereas more preservice teachers in Taiwan than in the U. S. indicated that calculators in elementary, middle, and high schools were "Effective." The chi-square values for the effectiveness of calculators are significant at $p < .001$ for all schools. Furthermore, preservice teachers from both places thought calculators as being "Very Effective" for high school rather than for elementary and middle schools.

Table 1

Preservice Teachers' Perceived Effectiveness of Technology Resources

Resource	VE	E	NE	I	VI	NF	Chi-sq.
A computer lab in each elementary school							88.10**
U. S.	64.7	33.0	1.1	0.6	0.0	0.6	
Taiwan	17.8	62.2	13.3	2.2	0.0	4.4	
A computer lab in each middle school							78.80**
U. S.	71.8	27.8	0.0	0.6	0.0	0.0	
Taiwan	26.7	61.1	6.7	0.6	0.6	4.4	
A computer lab in each high school							73.51**
U. S.	79.8	19.7	0.0	0.0	0.6	0.0	
Taiwan	35.6	55.6	3.3	0.6	1.7	3.3	
One computer for each elementary school classroom							26.44*
U. S.	40.0	42.2	6.9	4.0	5.8	1.2	
Taiwan	23.9	45.0	16.7	5.6	1.7	7.2	
One computer for each middle school classroom							25.27*
U. S.	42.8	39.7	7.5	4.6	5.8	0.6	
Taiwan	26.7	50.0	10.0	5.0	1.1	7.2	
One computer for each high school classroom							27.45*

U. S.	45.4	34.3	8.1	5.2	6.4	0.6	
Taiwan	32.8	48.9	7.2	3.3	0.6	7.2	

Resource	VE	E	NE	I	VI	NF	Chi-sq.
Several computers (4 to 5) for each elementary classroom							71.07**
U. S.	68.8	22.5	2.9	1.2	2.9	1.7	
Taiwan	27.8	34.4	14.4	8.9	3.3	11.1	
Several computers (4 to 5) for each middle school classroom							56.01**
U. S.	73.4	19.7	1.7	2.3	1.7	1.2	
Taiwan	35.6	36.7	8.3	7.2	2.8	9.4	
Several computers (4 to 5) for each high school classroom							40.45**
U. S.	74.6	19.1	1.2	2.3	1.7	1.2	
Taiwan	43.3	34.4	6.7	5.0	2.2	8.3	
Calculators in elementary school							
U. S.	14.0	33.1	6.4	24.4	19.2	2.9	60.45**
Taiwan	7.2	53.3	19.4	12.8	1.1	6.1	
Calculators in middle school							45.55**
U. S.	22.8	45.6	4.7	15.8	8.8	2.3	
Taiwan	11.1	71.7	8.9	5.0	0.0	3.3	
Calculators in high school							41.37**
U. S.	48.8	38.8	1.8	5.3	4.7	0.6	
Taiwan	29.4	62.8	5.0	0.0	0.0	2.8	
Interactive video equipment in each elementary school							38.51**
U. S.	0.0	45.4	35.5	9.3	0.6	9.3	
Taiwan	0.6	16.7	55.0	15.0	3.9	8.9	
Interactive video equipment in each middle school							38.57**
U. S.	0.0	51.7	33.1	5.2	0.6	9.3	
Taiwan	0.6	21.1	57.2	10.0	1.7	9.4	
Interactive video equipment in each high school							32.63**
U. S.	56.4	25.0	7.0	1.7	0.6	9.3	
Taiwan	31.1	52.2	6.7	1.1	0.0	8.9	

Note. VE = Very Effective, E = Effective, NE = No Effect, I = Ineffective, VI = Very Ineffective, NF = Not Familiar

* $p < .01$. ** $p < .001$

Preservice teachers in both places generally perceived greater effectiveness of interactive video equipment in high schools than in elementary and middle schools. More preservice teachers in the United States than their counterparts from Taiwan thought that interactive video equipment in each high school was "Very Effective" and in each elementary and middle school was "Effective" ($p < .001$). Furthermore, over 50% of preservice teachers in Taiwan thought that interactive video equipment was "Effective" only in high schools, but had "No Effect" on educational improvement in elementary and middle schools.

Discussion

Findings of this study reveal that there were certain common characteristics among preserve teachers in the United States and Taiwan. In general, preserve teachers in both places valued computer and technology resources highly. However, they valued a computer lab in each school and computers in each classroom higher than interactive video equipment and calculators. Furthermore, they all agreed that these technology resources were more important and useful for students in high schools than in elementary or middle schools.

Nonetheless, there were significant differences between the two groups of preservice teachers. Preserve teachers in the United States had more positive perceptions of the effectiveness of technology resources in bringing change and improving education than their counterparts from Taiwan. More of them responded "Very Effective" on most of the computer and technology resources. On the other hand, more preservice teachers in Taiwan responded that they were not familiar with computer and technology. Preservice teachers in Taiwan were also more conservative in their belief of the effectiveness of computer and technology in enhancing teaching and learning processes. An examination of their computer background reveals that preservice teachers in Taiwan generally have less experience in working with computers and other types of technology resources than their counterparts in the United States. This may partially explain the disparities found in this study, since prior experience in computer has been reported as the major factor in determining prospective teachers' perception of computers (Brownell, Brownell, & Zirkler, 1993; Huang & Padron, 1997). Increasing computer experience corresponded to more positive attitudes toward computers (Liao, 1995). Another plausible explanation for the significant disparities may include difference in social and cultural concepts. Preservice teachers in Taiwan may rely more on intrinsic efforts like individual's hard working and educational aspiration rather than external resources for educational improvement. Future research needs to investigate various factors related to differences in perceptions of computer and technology among preservice teachers of different places and cultures.

Findings of this study have several educational implications. First, it contributes to the knowledge base of the common belief of preservice teachers between countries and how they differ from each other in terms of their perceived effectiveness of technology. Second, the study identifies the technology areas that preservice teachers are less familiar, i.e., interactive video, and calls for teacher education program to address such needs. Third, it invites further investigation of the impact of some variables such as social value and cultural heritage on preservice teachers' perceptions of computer and technology in educational improvement. Teacher educators, however, should keep in mind that to make computers and other technological resources effective for educational improvement, preservice teachers must have competency in utilizing these resources. Indeed, the added value which telemedia may bring to education processes is strictly linked to how it is used (Trentin, 1996). Teacher educator may get help from research studies that provided strategies and suggestions to enhance preservice teachers' use and appreciation of computers and other technological resources (Handler, 1992, 1993; Petrakis, 1992; Stephen & Ryan, 1992; Tearle & Davis, 1995).

References

Brownell, G., Brownell, N., & Zirkler, D. (1993). Two studies: Attitude change during a required computer education course for preservice teachers. In D. Carey, R. Carey, D. A. Willis, & J. Willis (Eds.), *Technology and teacher education annual 1993* (pp. 136-142). Charlottesville, VA: Association for the Advancement of Computing in Education.

Handler, M. G. (1992). Successful strategies for increasing technology in preservice programs. In D. Carey, R. Carey, D. A. Willis, & J. Willis (Eds.), *Technology and teacher education annual 1992* (pp. 326-328). Charlottesville, VA: Association for the Advancement of Computing in Education.

Handler, M. G. (1993). Preparing new teachers to use technology: Perceptions and suggestions for teacher educators. *Computer Education, 20*(2), 147-156.

Huang, S. L. (1994). Prospective teachers' use and perception of the value of technology. In D. Carey, R. Carey, D. A. Willis, & J. Willis (Eds.), *Technology and teacher education annual 1994* (pp. 61-66). Charlottesville, VA: Association for the Advancement of Computing in Education.

Huang, S. L., & Padron, Y. N. (1997). Differences in prospective teachers' perceptions of computers: A cross-national study. In D. A. Willis, & J. Willis (Eds.), *Technology and teacher education annual 1997* (pp. 865-868). Charlottesville, VA: Association for the Advancement of Computing in Education.

Huang, S. L., & Waxman, H. C. & Padron, Y. N. (1995). Teacher education students' attitudes toward educational computing. In D. A. Willis, Robin, B. & J. Willis (Eds.), *Technology and teacher education annual 1995* (pp. 769-773). Charlottesville, VA: Association for the Advancement of Computing in Education.

Leutner, D., & Weinsier, P. D. (1994). Attitudes towards computers and information technology at three universities in Germany, Belgium, and the U. S. *Computer in Human Behavior, 10*, 569-91

Liao, Y. K. (1993). Effects of computer experience on computer attitudes among preservice, inservice, and postulant teachers. In D. Carey, R. Carey, D. A. Willis, & J. Willis (Eds.), *Technology and teacher education annual 1992* (pp. 498-505). Charlottesville, VA: Association for the Advancement of Computing in Education.

Liao, Y. K. (1995). A cross-cultural comparison of computer attitudes among preservice teachers. In D. A. Willis, Robin, B. & J. Willis (Eds.), *Technology and teacher education annual 1995* (pp. 61-65). Charlottesville, VA: Association for the Advancement of Computing in Education.

Makrakis, V. (1992). Cross-cultural comparison of computer anxiety in college students. *Journal of Educational Computing Research, 6*, 251-263.

Marcoulides, G. A. & Wang, X. B. (1990). A cross-cultural comparison of computer anxiety in college students. *Journal of Educational Computing Research, 6*, 251-263.

Padron, Y. N. (1993). Education students' attitudes toward the effectiveness of instructional technology. In D. Carey, R. Carey D. A. Willis, & J. Willis (Eds.), *Technology and teacher education annual 1993* (pp. 511-513). Charlottesville, VA: Association for the Advancement of Computing in Education.

Paprzycki, M., Vidakovic, D., & Ubermanowicz, S. (1995). Comparing attitudes toward computers of Polish and American prospective teachers. In D. A. Willis, Robin, B. & J. Willis (Eds.), *Technology and teacher education annual 1995* (pp. 41-44). Charlottesville, VA: Association for the Advancement of Computing in Education.

Pelgrum, W. J., & Plomp, T. (1993). Computers in education: Some international comparative research perspectives. *Studies in Educational Evaluation, 19*(2), 97-232.

Petrakis, E. (1992). Developing the computer-competent preservice teacher. In D. Carey, R. Carey, D. A. Willis, & J. Willis (Eds.), *Technology and teacher education annual 1993* (pp. 491-494). Charlottesville, VA: Association for the Advancement of Computing in Education.

Sensales, G., & Greenfield, P. M. (1995). Attitudes towards computers, science, and technology: A cross-national comparison between students in Rome and Los Angeles. *Journal of Cross-Cultural Psychology, 26*(3), 229-242.

Sheingold, K., & Hadley, M. (September, 1990). *Accomplished teachers: integrating computers into classroom practice*. New York: Bank Street College of Education, Center for Technology in Education.

Stephen, M. L., & Ryan, K. (1992). Efforts to promote technology at a teacher education institution. In D. Carey, R. Carey, D. A. Willis, & J. Willis (Eds.), *Technology and teacher education annual 1992* (pp. 354-356). Charlottesville, VA: Association for the Advancement of Computing in Education.

Tearle, T., & Davis, N. (1995). Multimedia resources for teacher education: An internationally transferable resource? In D. A. Willis, Robin, B. & J. Willis (Eds.), *Technology and teacher education annual 1995* (pp. 37-39). Charlottesville, VA: Association for the Advancement of Computing in Education.

Trentin, G. (1996). Internet: Does it really bring added value to education? *Educational Technology Review*, 6,10-13.

Waxman, H. C., Huang, S. L., & Padron, Y. N. (1992) *Educational technology survey*. Houston: University of Houston.

Wubbels, T. (1993). Cross-national study of learning environments. In D. L. Fisher (Ed.), *The Study of Learning Environments*, (Vol. 7, pp. 112-120). Perth, Western Australia: Curtin University of Technology.

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